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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,301	07/22/2003	Alexei Vitukhnovsky	SGK-2215	8389

7590 11/22/2004
Dr. Sergei Krivoshlykov
ALTAIR Center, LLC
1 Chartwell Circle
Shrewsbury, MA 01545

EXAMINER

PERRY, ANTHONY T

ART UNIT PAPER NUMBER

2879

DATE MAILED: 11/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/625,301

Applicant(s)

VITUKHNOVSKY ET AL.

Examiner

Anthony T Perry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 August 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/06)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

The Amendment, filed on 8/25/04, has been entered and acknowledged by the Examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Marrocco, III et al. (US 2002/0028347 A1).

Regarding claim 1, the Marrocco reference teaches an electro-luminescent light emitting device (10) having a multi-layer structure deposited on a transparent substrate (22) comprising an active light emitting layer (18), a hole injecting electrode (20), a hole transfer layer (14), an electron injecting electrode (12), and an electron transfer layer (16) (see Fig. 1). The active light emitting layer comprises of organic materials having a locus comprising a lanthanide ion in the 3+ oxidative state (see for example paragraphs 0024-0029). The locus is embedded in a periphery having a hyperbranched dendrimer-like architecture (see for example paragraphs 0044-0045). The functional limitations, "...with good energy accepting properties and high light emitting efficiency embedded into a periphery with high electronic excitation and energy donating properties, collecting electron and hole charge carriers, producing excited states via the electron-hole recombination process followed by electronic excitation energy transfer from the periphery to the locus and converting the energy into the emitting light" and "...providing

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efficient energy transfer from triplet level of the periphery, that is efficiently excited via electron-hole recombination, to 4f orbitals of the locus, and ensuring spatial separation of the light emitting locus centers preventing concentration self-quenching of their luminescence light emission” are taught by the Marrocco reference under the principles of functional inherency since Marrocco et al. disclose all of the structural limitations.

Regarding claim 2, Marrocco et al. teach the active light emitting layer comprising light harvesting dendrimers (see for example paragraphs 0033-0035 and 0105). The functional limitation, “providing the electron-hole recombination on an external dendrimer shell with consequent energy transfer to said locus by one- or multi-step processes” is taught by the Marrocco reference under the principles of functional inherency since Marrocco et al. disclose all of the structural limitations.

Regarding claim 3, Marrocco et al. teach the active light emitting layer comprising a π -electron dendrimer (see for example paragraph 0107). The functional limitation, “providing the electron-hole recombination inside the dendrimer with consequent energy transfer to said locus” is taught by the Marrocco reference under the principles of functional inherency since Marrocco et al. disclose all of the structural limitations.

Regarding claims 4-6, Marrocco et al. teach the locus being Tb^{+3} ions, Eu^{+3} ions, and Sm^{+3} ions (see for example paragraphs 0024-0026).

Response to Arguments

Applicant's arguments filed 8/25/04 have been fully considered but they are not persuasive.

Marrocco et al. teach the same problems with prior art OLED active materials as the current application (see paragraph 0005). That “typically, both the singlet and triplet excited states are populated during the operation of an OLED. Unfortunately, only decay from the singlet state produces useful light. Decay from the triplet state to a singlet ground state is spin forbidden and therefore slow, giving non-radiative processes more time to take place. Because the triplet state is three-fold degenerate and the singlet state is not degenerate; three quarters of the excited electrons enter the triplet state and produce little or no light.” Marrocco et al. teach the same objective of providing electroluminescent devices with higher efficiency, not limited by decay from non-luminescent triplet states (see paragraph 0010).

Marrocco also teaches that the absorption and emission bands of lanthanide metals are very narrow, due to the fact that energy transfer occurs between the 4f orbitals of the lanthanides, which are "buried" within outer filled d and s orbitals (see paragraph 0023). The reference further teaches that the excited state of a lanthanide ion produces much more light (about four times more) than an excited organic compound. Also, the luminescent metal ion or complexes can accept energy from both singlet and triplet states of organic molecules. In this way, the excited energy in the organic singlet state that was otherwise destined to be lost to non-radiative transitions is transferred to a metal, which then radiates (see paragraph 0026). Although the devices of the Marrocco reference are still partly organic, the metal ions exert a protective effect by removing energy from the organic excited state. The devices of the present invention are thus expected to have longer lifetimes than all-organic devices (see paragraph 0027).

The Marrocco reference teaches specific design of the hyper-branched polymers that provides efficient energy transfer between the shell and the locus (see for example paragraphs 0028 and 0033). For example, paragraph 0028 states, “In the practice of the present invention, a luminescent or fluorescent metal ion or complex, preferably a lanthanide metal ion or complex, is embedded within a

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fluorescent organic matrix, producing a system wherein the organic matrix may be elevated to an excited state, which then transfers its energy to the metal ion or complex which then emits light. The energy transfer between the organic matrix and metal may be enhanced by providing coordination sites for the metal on the organic matrix. The energy transfer may also be enhanced by providing the metal with polarizable ligands.”

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to *Anthony Perry* whose telephone number is (571) 272-2459. The examiner can normally be reached between the hours of 9:00AM to 5:30PM Monday thru Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel, can be reached on (571) 272-24597. **The fax phone number for this Group is (703) 872-9306.**

Communications via Internet e-mail regarding this application, other than those under 35 U.S.C. 132 or which otherwise require a signature, may be used by the applicant and should be addressed to [Anthony.perry@uspto.gov].

All Internet e-mail communications will be made of record in the application file. PTO employees do not engage in Internet communications where there exists a possibility that sensitive information could be identified or exchanged unless the record includes a properly signed express waiver of the confidentiality requirements of 35 U.S.C. 122. This is more clearly set forth in the Interim Internet Usage Policy published in the Official Gazette of the Patent and Trademark on February 25, 1997 at 1195 OG 89.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



Anthony Perry
Patent Examiner
Art Unit 2879
November 11, 2004



Vip Patel
Primary Examiner
Art Unit 2879